

Management and prevention of SARS in China

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The case fatality was the lowest (3.8%) among 1512 cases with severe acute respiratory syndrome (SARS) in Guangdong Province, China. Rational use of corticosteroid, non-invasive ventilation and the integration of traditional Chinese medicine and modern medicine may partly have contributed to the lowest fatality figure. There was a close linkage between civet cats and humans in terms of transmission of SARS. Strict control of the wild-animal market may be significant in preventing a new outbreak of SARS this year.

Keywords: SARS; SARS coronavirus; civet cat; wildlife market

The first case of SARS that I encountered at Guangzhou was a 41-year-old man who developed a high fever (39.6 °C), malaise, myalgia for 3 days, bilateral infiltration in a chest radiograph and no response to antibiotics (azithromycin and ofloxacin; Xiao *et al.* 2003). The patient was referred to my institute (Guangzhou Institute of Respiratory Diseases) on 22 December 2002. On 27 December 2002 he developed severe hypoxaemia, presenting with tachypnoea (55 min⁻¹) and poor saturation (oxygen index 137), and was then intubated for mechanical ventilation. Methylprednisolone at a daily dose of 160 mg was given. After 34 days' ventilation, he was extubated and was discharged on 15 March 2003. During his admission we were told that another eight persons with a close contact history with him developed a similar pneumonia 8–10 days after his admission. At that time we had no knowledge of the disease and diagnosed it as pneumonia with an unknown cause, then as atypical pneumonia. The patient was diagnosed with SARS by a fourfold rise in serum SARS-CoV IgG antibody at the end of March 2003. Since the first report of SARS at the end of December 2003, reports of SARS cases increased, first in the cities of Guangdong, then in Hong Kong, then in other cities in mainland China and more than 30 countries across five continents.

From the clinical epidemiology perspective, it was proved that the SARS epidemic originated from Guangdong (Chan-Yeung & Yu 2003). Virus epidemiology also confirmed that SARS-CoV isolates from Guangzhou shared the same origin with those in other countries and had a phylogenetic pathway that matched the spread of SARS to other regions of the world (Zhong *et al.* 2003).

During the 2002–2003 SARS epidemic in Guangdong, 1512 people were infected and 58 deaths occurred, with a case fatality rate of 3.8%, which ranked as the lowest in the world. In addition to the difference in the severity of the epidemic and age distribution among different countries or regions, rational management contributed partly to the lowest mortality in Guangdong. In those with criti-

cal SARS (rapid development of dyspnoea with respiratory rate of more than or equal to 30 min⁻¹, persistent high fever for more than 3 days, or rapid deterioration of the chest film with increased infiltrates progressing to a critical condition), use of corticosteroid (methylprednisolone 1–2 mg kg⁻¹ d⁻¹) demonstrated a definite efficacy in 53% of patients. The Guangzhou experience showed that the percentage of bone necrosis (femur and knee) after corticosteroid therapy was 4%, which may be related to the steroid dosage; 20–30% of patients with critical SARS received non-invasive facial/nasal mask ventilation (mainly continuous positive airway pressure), which enabled improvement of oxygenation in early stages and prevented patients from requiring intubation. Data showed that non-invasive ventilation did not cause cross-infection (Zhong & Zeng 2003); the integration of traditional Chinese medicine and Western medicine further relieved dyspnoea and malaise and facilitated the resolution of pulmonary infiltration.

Between 16 December 2003 and 30 January 2004, there were four new diagnosed SARS patients found in Guangzhou. There was a close linkage of SARS-CoV between humans and small wild mammals, in particular civet cats, based on the following.

- (i) SARS-CoV (isolated or PCR-tested) found in throat swab (faeces) specimen in 76% of civet cats being surveyed in Guangdong.
- (ii) SARS-CoV was detectable in the faeces of civet cats even at a dilution of 10⁻⁹.
- (iii) Serum SARS-CoV IgG was found in 40% of wild-animal traders, which was much higher than in those with other occupations such as vegetable traders, butchers and healthy individuals.
- (iv) A high homology of the S-gene sequence of SARS-CoV isolated from throat swab specimens between the first case of SARS and the civet cat.
- (v) The second new case of SARS was a waitress at an exotic food restaurant, where SARS-CoV-positive specimens (reverse transcription–polymerase chain reaction N and M genes) were found in five out of seven cages of civet cats.
- (vi) It was thus highly suspected that civet cats were an important potential source of infection.

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The Cantonese enjoy eating exotic foods in the cold weather, which is considered to enhance the vitality of the body. Therefore the wildlife market blossoms during the wintertime, which, in turn, may cause more cross-infection of SARS from wildlife to humans.

At the beginning of 2004, the Guangdong government and Department of Public Health had taken strong action regarding the following. (i) Strict control of the wildlife market, including a ban on the rearing, sales, transport, slaughter and food processing of small wild mammals and civet cats in particular. Seventeen rearing farms were closed within 5 days. (ii) 'Four earliness' (early identification, early report, early isolation and early management) to stop transmission from human to human. All four suspected cases of infection were isolated immediately after being suspected of having SARS. All close contacts were quarantined. This control strategy seems to be working: there have been no new cases since 30 January 2004. However, it would be premature to confirm that the outbreak of SARS is well under control. Whether the control of the wildlife market was the key to avoiding the source of SARS transmission requires further verification.

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GLOSSARY

- SARS: severe acute respiratory syndrome
- SARS-CoV: severe acute respiratory syndrome coronavirus